Hw 1

Read chapters 1 and 2 of the textbook. Main skills: you need to know how to :

- Translate a (mathematically meaningful) English sentence into a symbolic sentence, using symbols for basic statements and connectives and vice-versa.
- Understand the connectives **and , or, not, implies** and **iff**.
- Build a truth table.
- Decide if two statements are equivalent, decide if a statement is a tautology or a contradiction.
- Write the negation a statement.

Do the following problems from your textbook:

- p. 9: 1.2 , 1.4 (you will need to use quantifiers here)
- p. 20: 2.4, 2.5
- p. 54: 10 (just say what is wrong with the proof, ignore the second question: "What does the argument prove ?)

. Do the following additional problems

1. If P stands for "13 is a prime number" , Q stands for "13 is even" and R stands for "13 is divisible by 3", write English sentences for each of the following:
   i) Q $\Rightarrow$ not P
   ii) P and (not Q)
   iii) (not Q) $\Rightarrow$ (P or R)
   iv) Q $\Rightarrow$ P
2. Define a new connective *notor* as follows: $PnotorQ$ means $\neg(P \vee Q)$. Show that the three basic connectives $\neg, \vee, \wedge$ can all be written in terms of the single connective *notor*, that is:
   - Write a statement equivalent to $\neg P$ using *notor* as only connective.
   - Write a statement equivalent to $P \vee Q$ using *notor* as only connective.
   - Write a statement equivalent to $P \wedge Q$ using *notor* as only connective.
3. Using the symbols S for "John is sleepy" and L for "John is Lazy" translate each of the following sentences into symbolic form.
   (a) John isn't sleepy and he is lazy, or he is sleepy.
   (b) John is sleepy.

(c) John isn't lazy.

If I know that John isn't sleepy and he is lazy, or he is sleepy and that John is sleepy, can I conclude that John isn't lazy?

4. Build truth table for the statement ((P and Q) or R) $\Rightarrow$ W. How many rows should such a truth table have ?